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CPUC Potentials, Goals and Targets (PGT) Study Update

Presentation to CPUC ED for Industrial Action Plan (IAP)

August 8, 2013

Navigant Reference: 150283

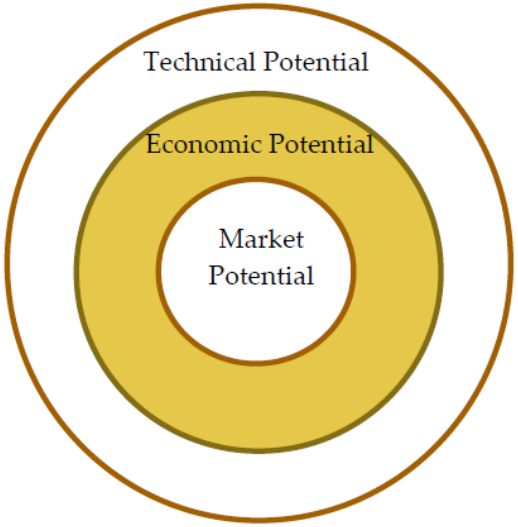
Analysis to Update Energy Efficiency Potential and Goals for 2013

- **Study purpose:**
  - Statewide assessment of energy efficiency potential to support the State regulatory framework.
  - Consideration of key policy mechanisms employed by the State to drive the energy efficiency market.
  - Energy efficiency forecasts.

- **Technical Potential**
  - Technical potential is defined as the amount of energy savings that would be possible if the highest level of efficiency for all technically applicable opportunities to improve energy efficiency were taken, including retrofit measures, replace-on burnout measures, and new construction measures.

- **Economic Potential**
  - Using the results of the technical potential analysis, the economic potential is calculated as the total energy efficiency potential available when limited to only cost-effective measures. All components of economic potential are a subset of technical potential. The technical and economic potential represent the total energy savings available each year that are above the baseline of the Title 20/24 codes and federal appliance standards. (Cost-effectiveness: Non-emerging technology TRC ≥ 0.85; emerging technology TRC ≥ 0.75 (and TRC ≥ 0.85 within 10 years of introduction))

- **Market Potential**
  - The final output of the potential study is a market potential analysis, which calculates the energy efficiency savings that could be expected in response to specific levels of incentives and assumptions about market influences and barriers. All components of market potential are a subset of economic potential. Some studies also refer to this as "maximum achievable potential." Market potential is used to establish the utilities' energy efficiency goals, as determined by the California Public Utilities Commission (CPUC).



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AIMS is an acronym for four sectors that will be integrated into the current study.

Sector	% of IOU Electric Consumption	% of IOU Gas Consumption
Agriculture	4%	1%
Industrial	13%	30%
Mining	2%	2%
Street Lighting	1%	0%
Total	*20%*	*33%*

Source: CEC, http://ecdms.energy.ca.gov/, data is for 2010
(California Energy Consumption Database)

- **The mining and street lighting sectors have not been addressed in previous studies.**
- **The 2011 Navigant potential model was the first model of Ag sector potential**

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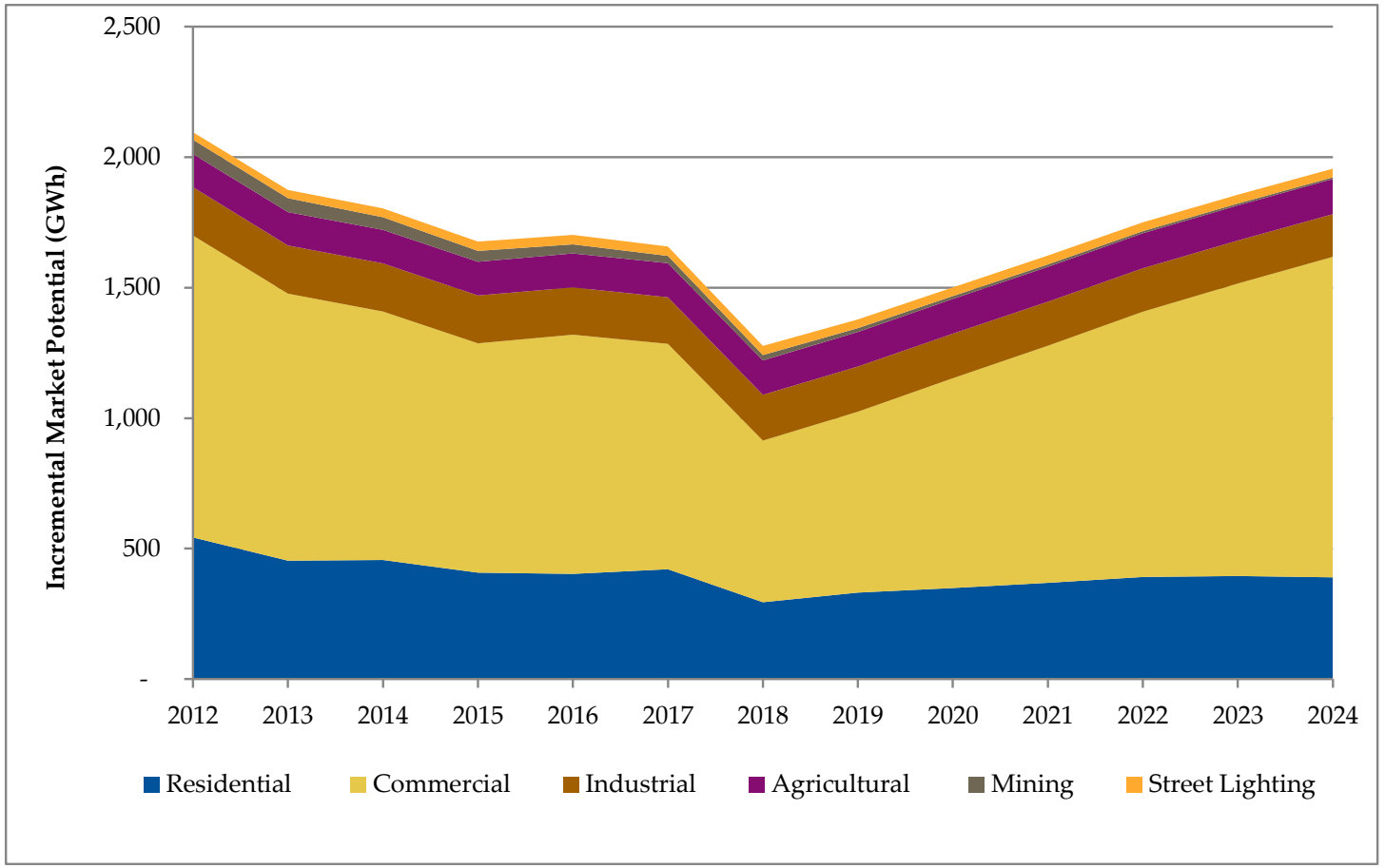
Annual incremental market potential by sector

- AIMS represents about 20% of forecast IOU GWh consumption and also about 20% total incremental market potential



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The following list provides an overview of the primary resources that the AIMS *industrial* team has used for data collection and literature research.

- **IAC Database**
  - The DOE's Industrial Assessment Centers (IAC) database - http://iac.rutgers.edu/database
- **California Energy Commission (CEC) data**
  - Historical Quarterly Fuel and Energy Report (QFER) consumption data aggregated for the three IOUs, broken down by sub-sector (NAICS code)
  - Historical onsite generation data by sub-sector to supplement the QFER data.
  - CEC forecast data, by sub-sector, projected until 2022
- **'06-'08 evaluation reports**
  - Process Evaluation of Pacific Gas & Electric Company's 2006-2008 High-Tech Program. http://calmac.org/publications/HighTechProcessEval_Rpt_FINAL_2009May20.pdf
  - 2006-2008 Evaluation Report for PG&E Fabrication, Process and Manufacturing Contract Group. http://www.calmac.org/publications/PG&E_Fab_06-08_Eval_Final_Report.pdf
- **KEMA industrial market characterization studies (2012)**
  - Cover various industrial sub-sectors, including the chemical industry, plastics, cement, paper, and glass.
- **Various DOE/LBNL industrial resources**
  - Energy Star "Industries in Focus" - http://www.energystar.gov/index.cfm?c=in_focus.bus_industries_focus
  - EIA Manufacturing Energy Consumption Surveys (MECS) - http://www.eia.gov/emeu/mecs/

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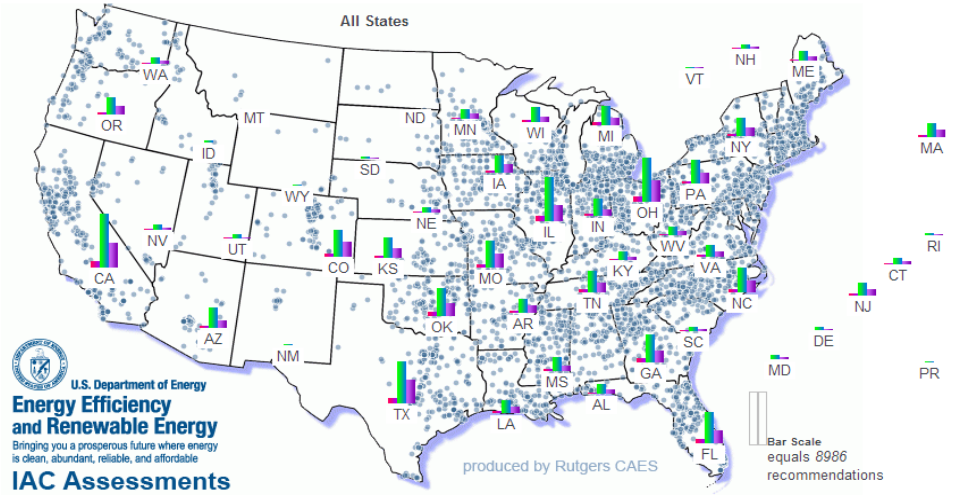
IAC Database

- **To-date, the IAC has assessed 16,000 individual industrial sites comprising 120,000 energy efficiency recommendations.**

- **The potential study draws from California and National data.**
  - 1,101 assessments and 8,986 recommendations originate from California
  - California is the largest contributing state
  - Recommendation implementation rate: 45%
  - Many manufacturers are national and processes tend to be consistent across plants, so a process enhancement or EE recommendation in one state often applies to operations in another state.



- **Relationship between the potential study approach and the Strategic Plan.**
  - Build market value and demand for (continuous improvement in industrial) energy efficiency through branding and certification
  - Detailed Strategies related to the potential model approach:
    - Create tracking and scoring systems to measure resource efficiency improvements (integrated with national effort)
    - Participate in planning DOE/EPA's national Plant Energy Efficiency Certification Program.

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Navigant constructed supply curves for the following industrial sub-sectors and end uses.

Industrial Segment	Segment NAICS Code(s)
Petroleum	324
Food	311x, 312
Electronics	334x, 335
Stone-Glass-Clay	327x
Chemicals	325
Plastics	326
Fabricated Metals	332
Primary Metals	331
Industrial Machinery	333
Transportation Equipment	336
Paper	322x
Printing & Publishing	323, 511, 516
Textiles	313, 314, 315, 316
Lumber & Furniture	337, 321, 1133
All Other Industrial	339

End Use	Fuel Type(s)
Facility Lighting	Electric
Process Cooling and Refrigeration	Electric
Machine Drive	Electric
Conventional Boiler Use	Gas
Process Heating	Gas, Electric
Facility HVAC	Gas, Electric

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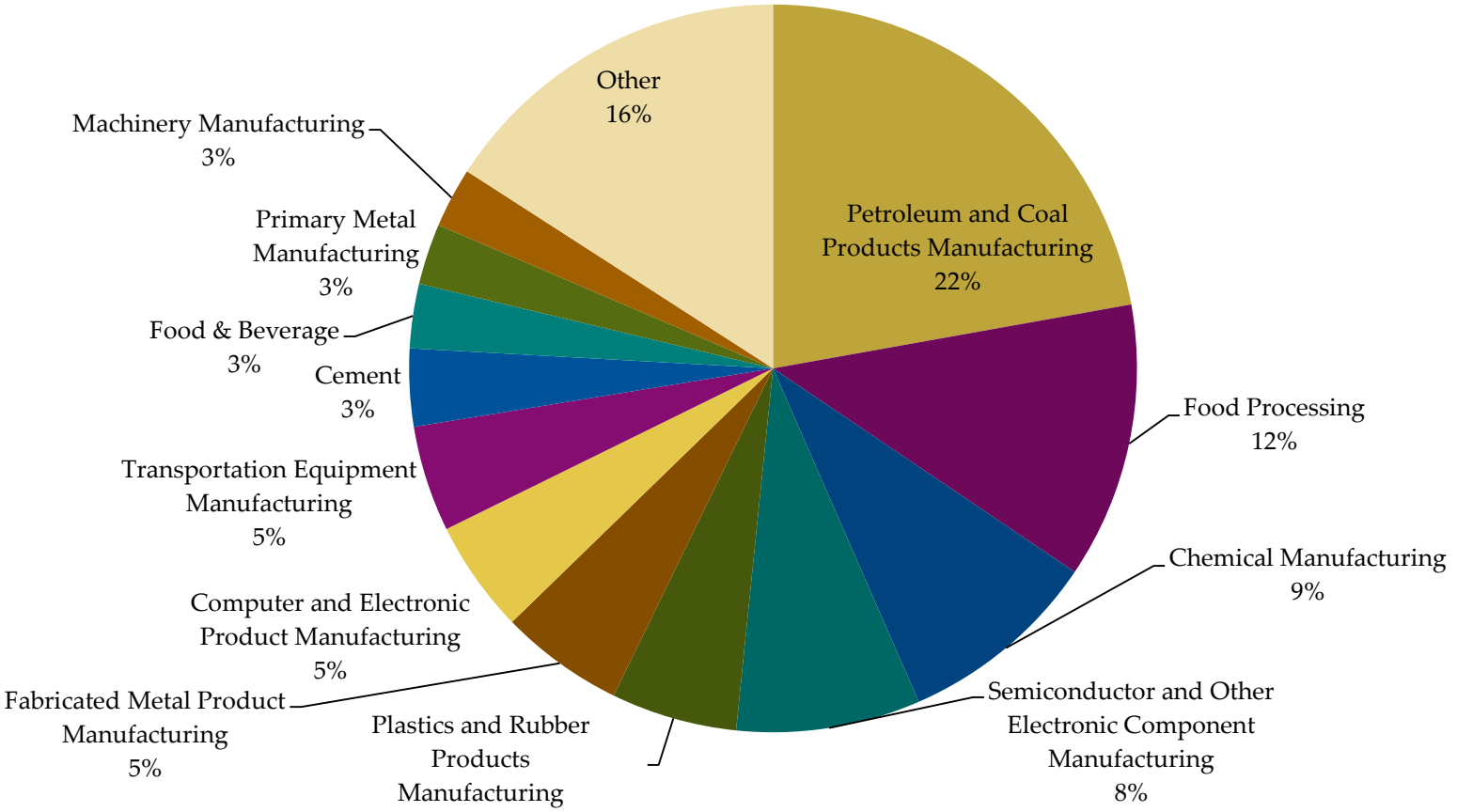
Electric consumption distribution, 2011, by industrial sub-sector: 12 of 26 sub-sectors make up over 84% of consumption.



Note: Aggregated for PGE, SCE, and SDGE.

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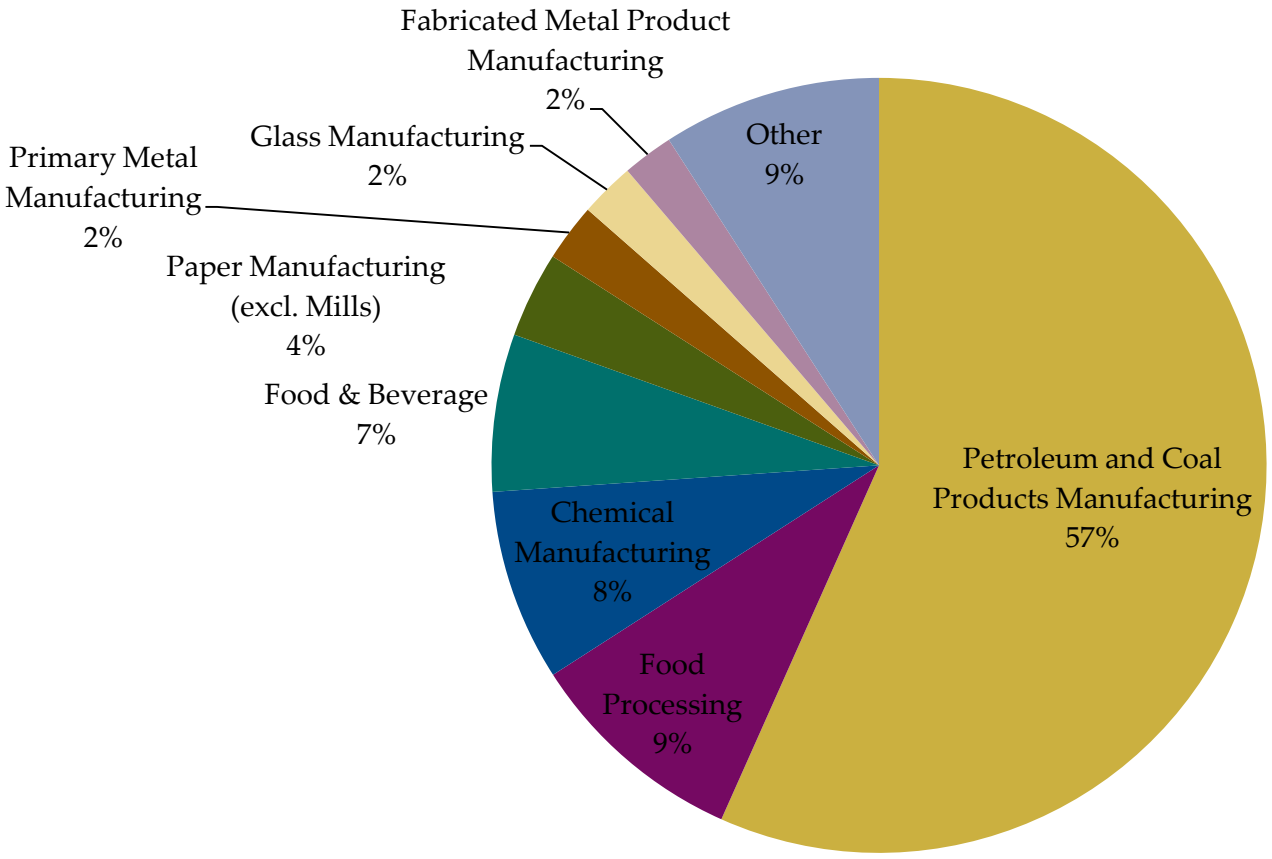
Gas consumption distribution, 2011, by industrial sub-sector: : 8 of 26 sub-sectors make up over 90% of consumption.



Note: Aggregated for PGE, SCG, and SDGE.

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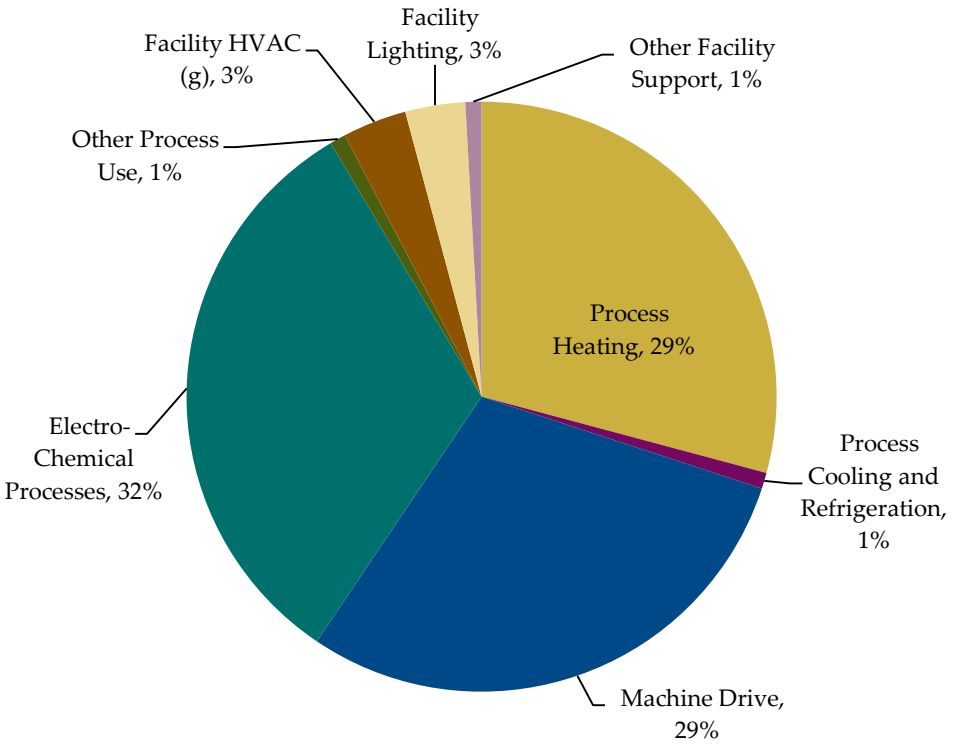
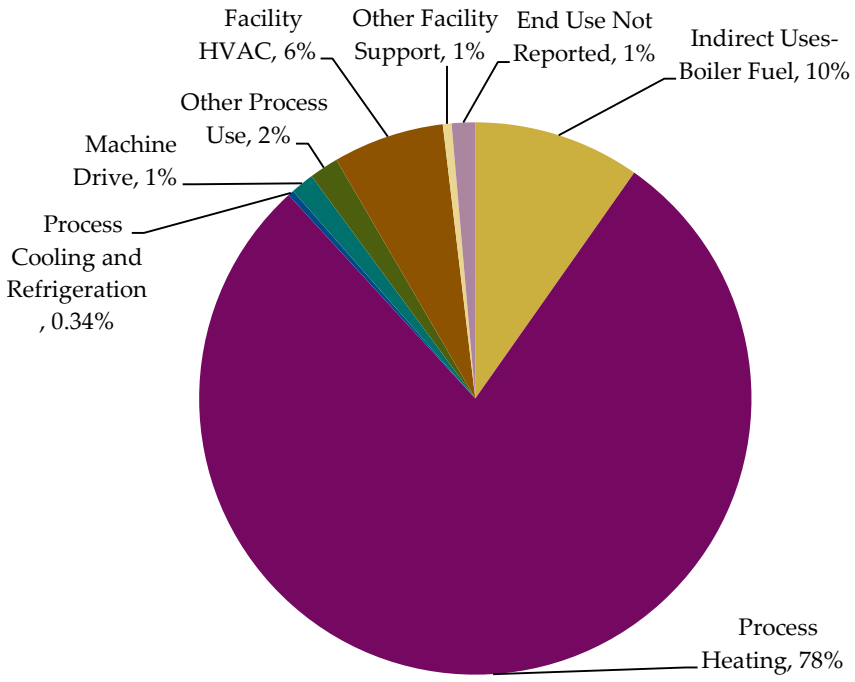
Example: NAICS 331 – Primary Metals

Energy consumption distributions by end-use developed from Manufacturing Energy Consumption Survey (MECS) data. http://www.eia.gov/consumption/manufacturing/index.cfm

Electric



Gas



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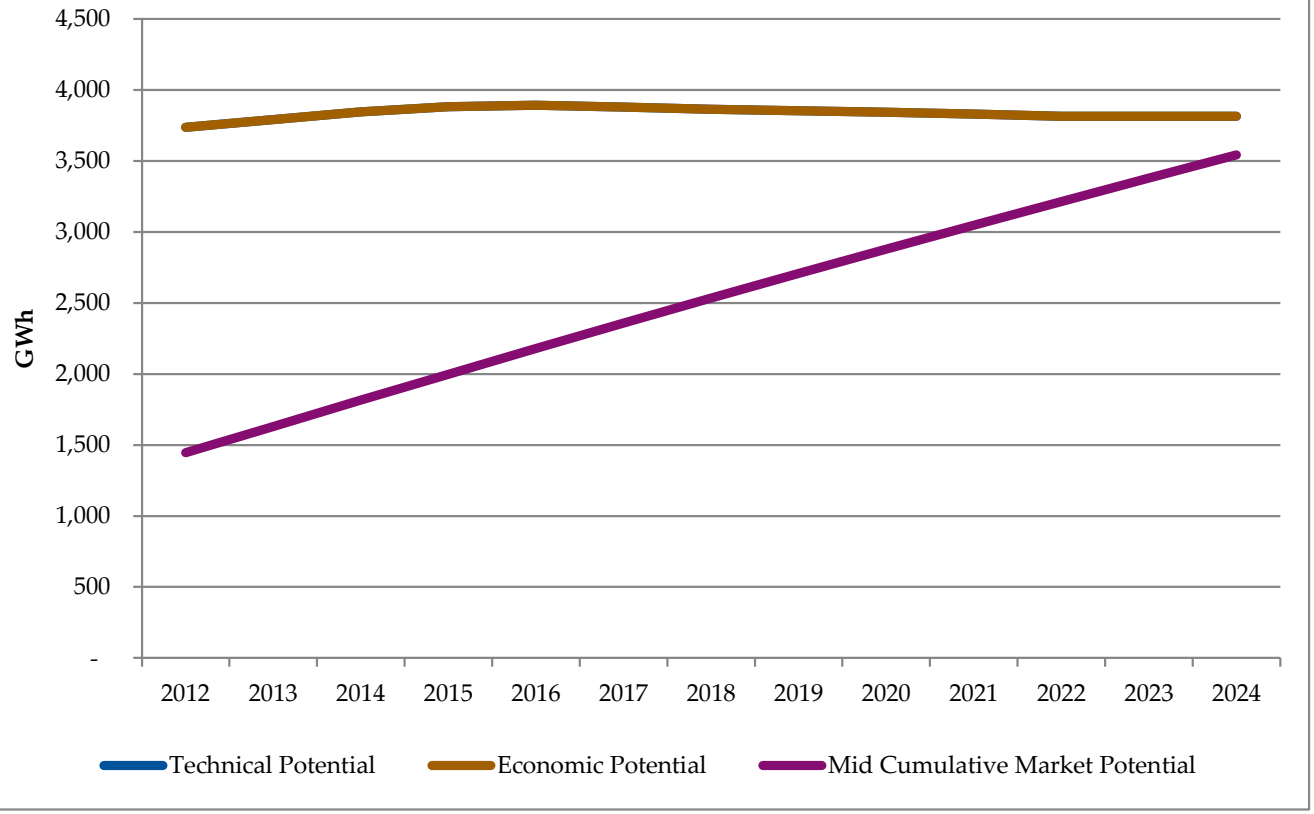
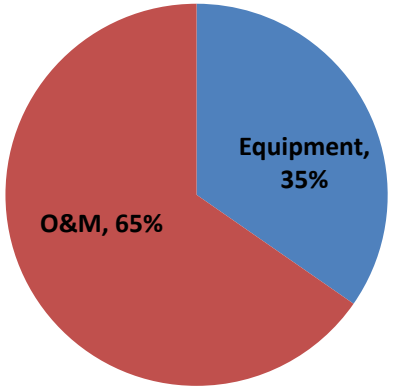
2013 Preliminary Results - Do Not Cite

Aggregate IOU Industrial Technical, Economic and Cumulative Market Potential for 2012 - 2024 (GWh)*



*Cumulative market potential reflects measure installations starting in 2006.

Differentiating Equipment and O&M measures:
Cumulative Market Potential distribution by 2024:



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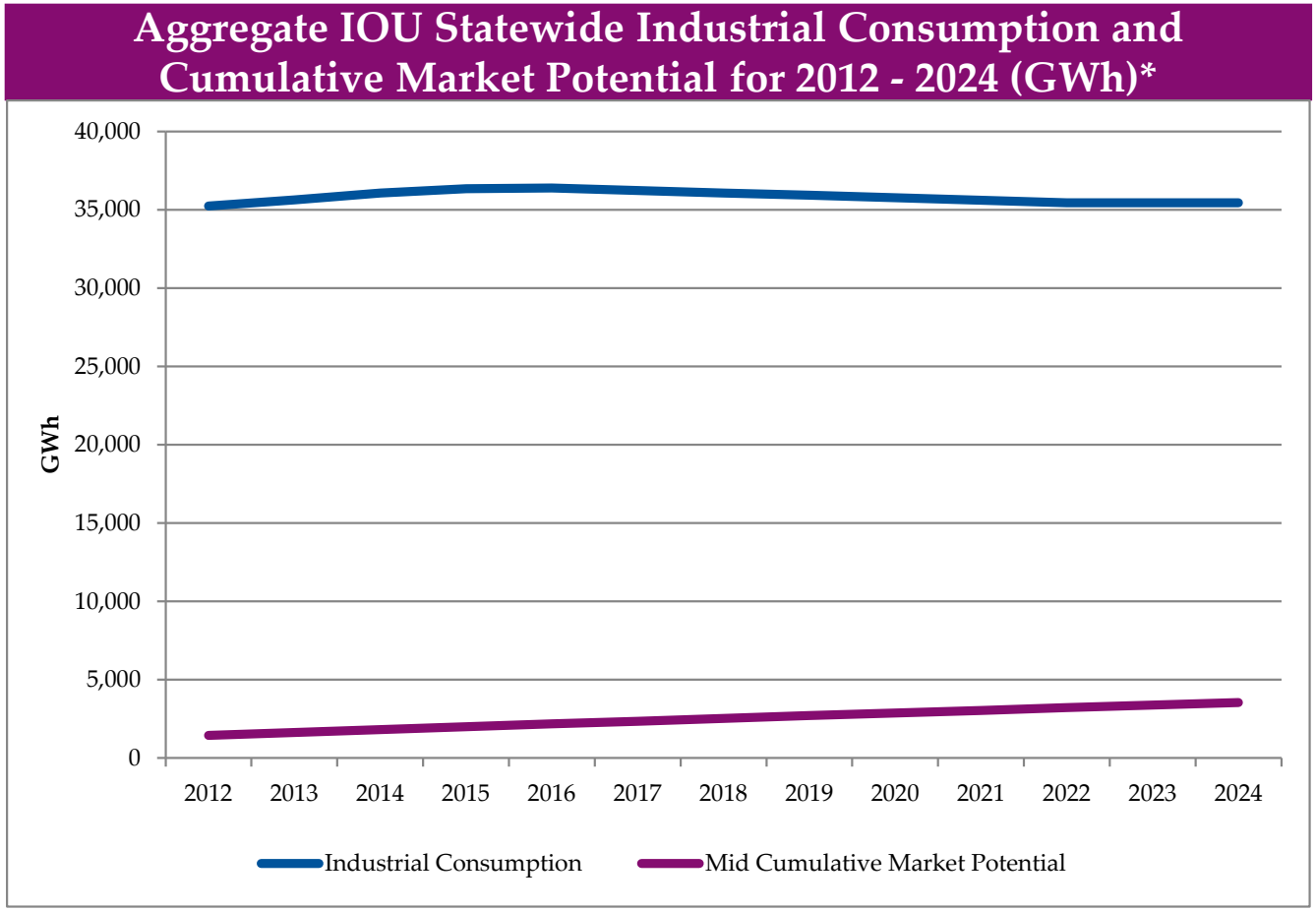
2013 Preliminary Results - Do Not Cite



Cumulative Market Potential in 2024: 10.0% of Industrial Consumption.

*Cumulative market potential reflects measure installations starting in 2006.

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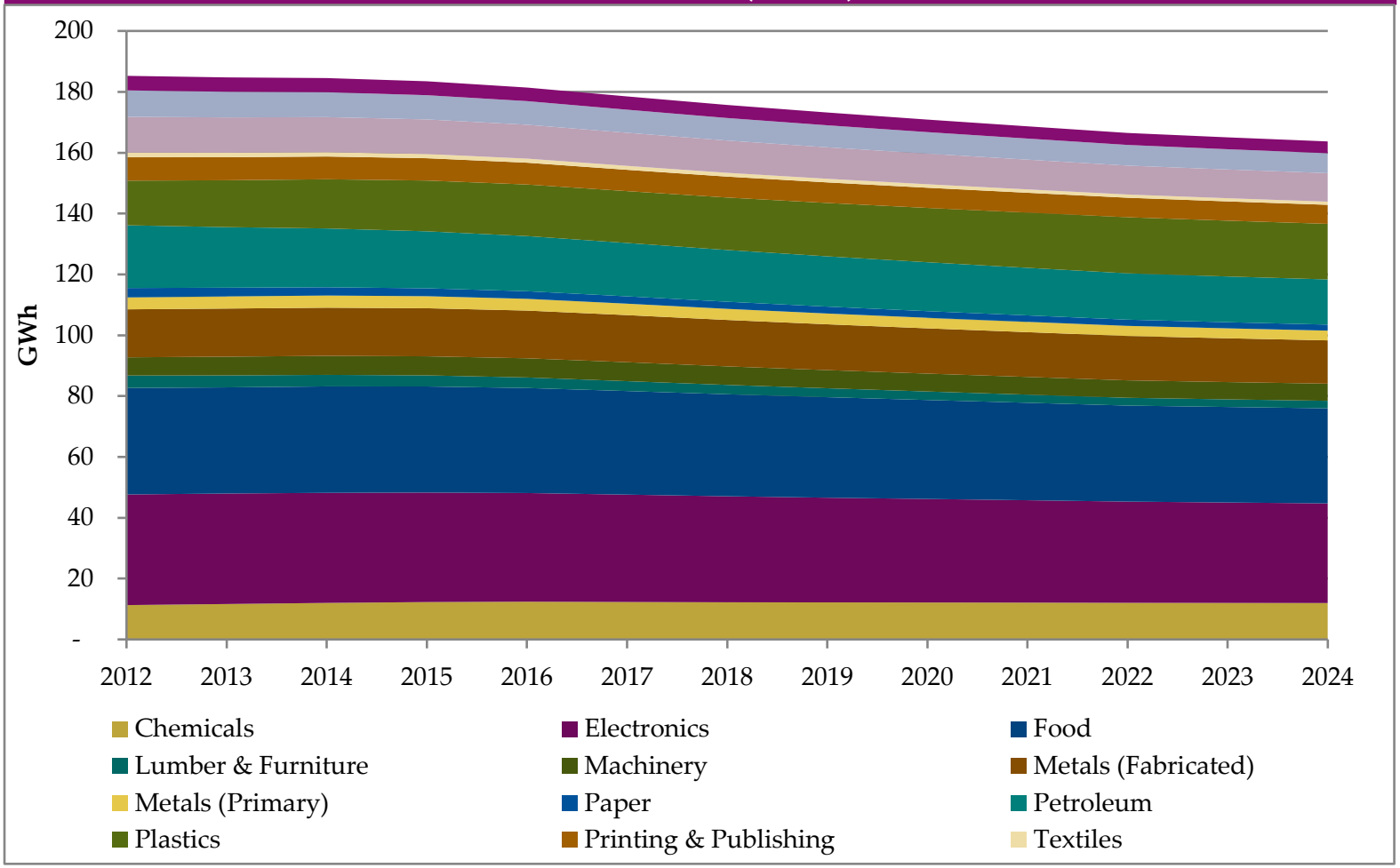
2013 Preliminary Results - Do Not Cite

Aggregate IOU Industrial Incremental Market Potential by Sub-Sector for 2012 – 2024 (GWh)



NAVIGANT ENERGY

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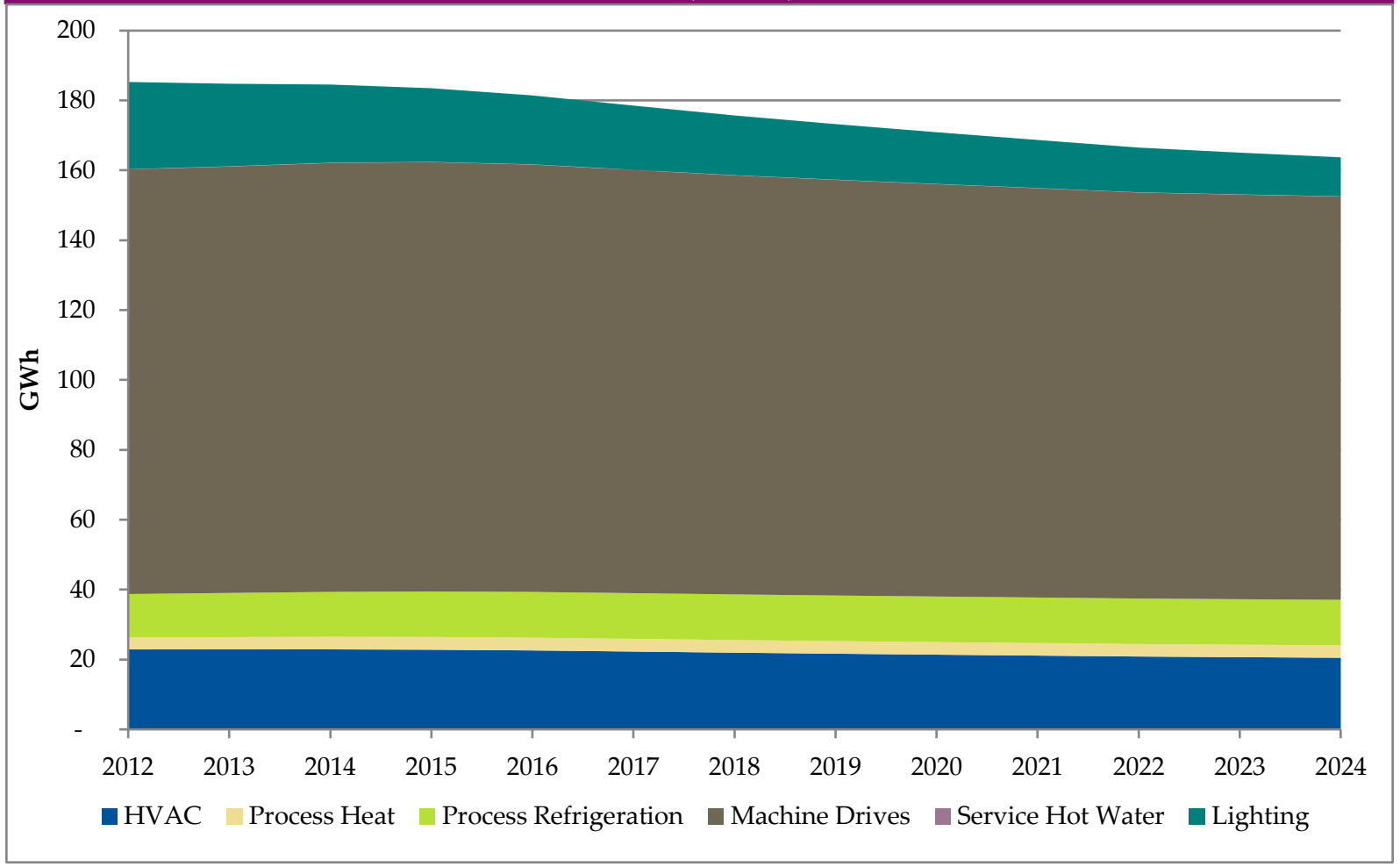
Aggregate IOU Industrial Incremental Market Potential by End-Use for 2012 – 2024 (GWh)



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Refresh/Saturate Assumptions by End Use and Sub-Sector

	Fabricated Metals (NAICS 332)	Food (NAICS 311x, 312)	Electronics (NAICS 334x, 335)	Stone-Glass-Clay (NAICS 327x)	Chemicals (NAICS 325)	Plastics (NAICS 326)	Primary Metals (NAICS 331)	Industrial Machinery (NAICS 333)	Transportation Equipment (NAICS 336)	Paper (NAICS 322x)	Printing & Publishing (NAICS 323, 511, 516	Textiles (NAICS 313, 314, 315, 316)	Lumber & Furniture (NAICS 337, 321, 1133	All Other Industrial (NAICS 339)	Petroleum (NAICS 324)
Equipment															
HVAC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lighting	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MachDr	0	1	1	0	1	1	0	1	1	0	0	1	0	1	0
ProcHeat	0	1	1	0	1	1	0	1	1	0	0	1	0	1	0
ProcRefrig	0	1	1	0	1	1	0	1	1	0	0	1	0	1	0
SHW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
O&M															
HVAC	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Lighting	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MachDr	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
ProcHeat	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
ProcRefrig	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
SHW	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Refresh =1
Saturate = 0

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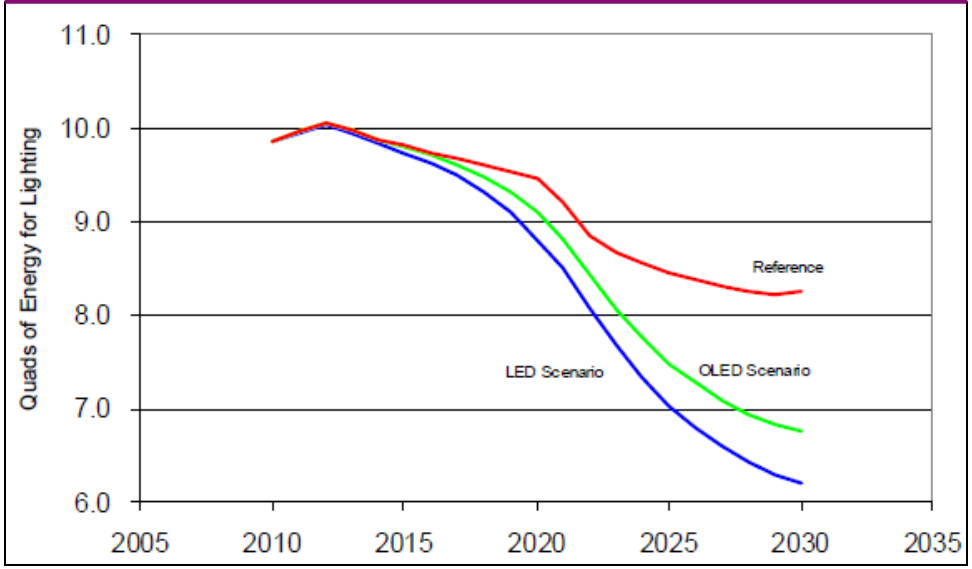
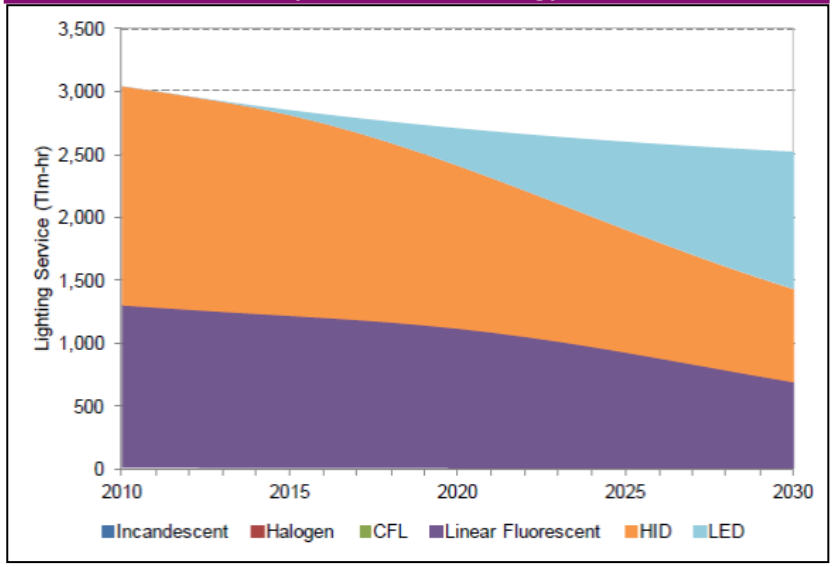
National Energy Consumption for Lighting through 2030 for Each Scenario (Quads)



Source: Navigant 2010, Energy Savings Potential of Solid-State Lighting in General Illumination Applications 2010 to 2030

Note: The scale in the image above starts at 6.0 Quad rather than 0.

Industrial Lighting Service Forecast (Teralumen-Hours Served by Each Technology), 2010 to 2030



Source: Energy Savings Potential of Solid-State Lighting in General Illumination Applications, January 2012

Other secondary sources indicate that energy consumption by lighting is anticipated to decrease by about 40% in a scenario with heavy LED adoption.

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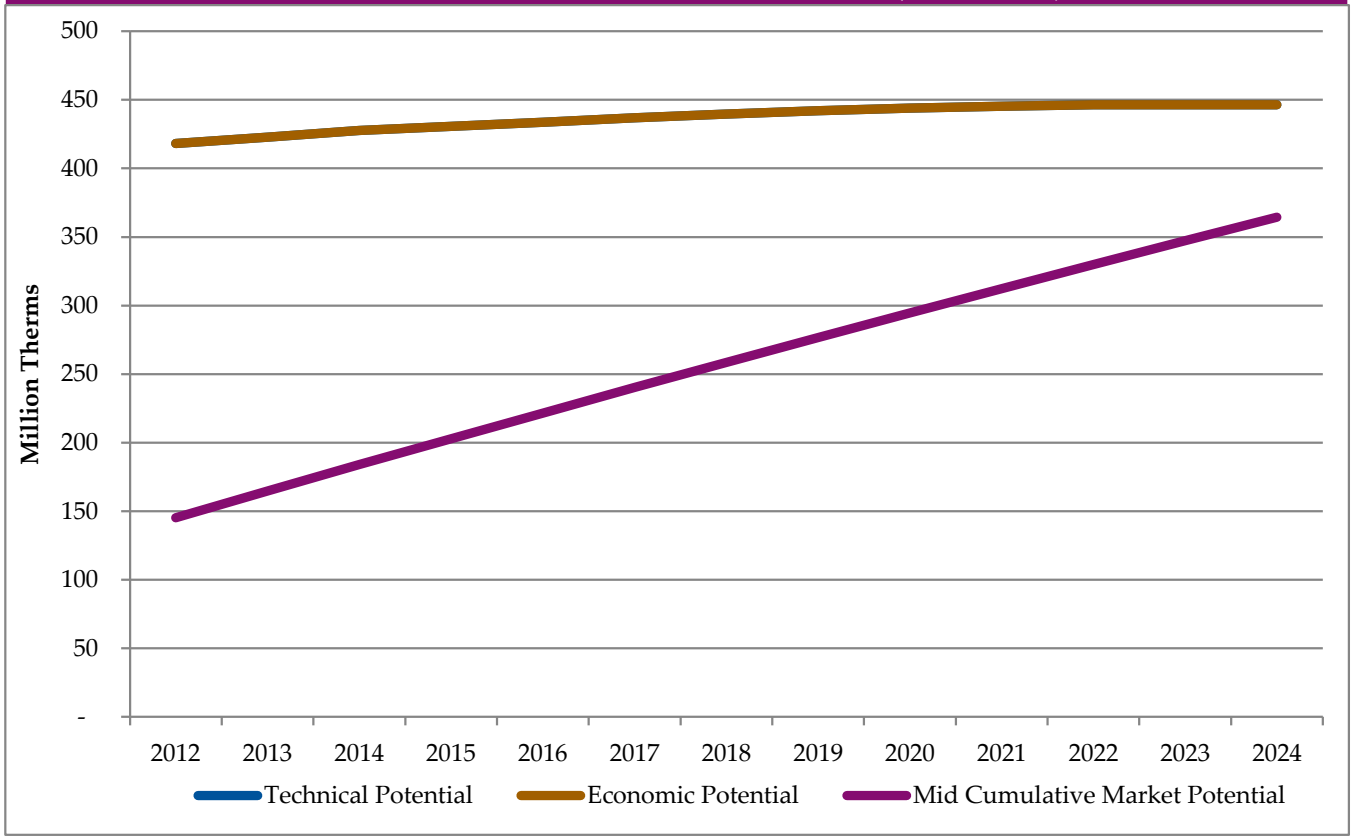
2013 Preliminary Results - Do Not Cite

Aggregate IOU Industrial Technical, Economic and Cumulative Market Potential for 2012 - 2024 (Therms)*



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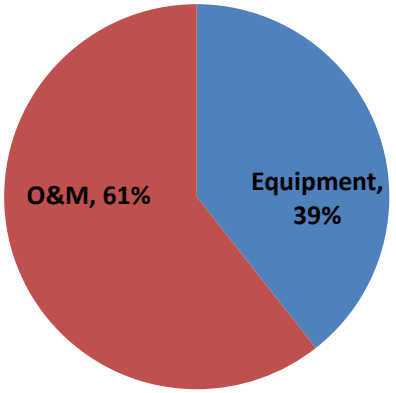
Differentiating Equipment and O&M measures:
Cumulative Market Potential distribution by 2024:



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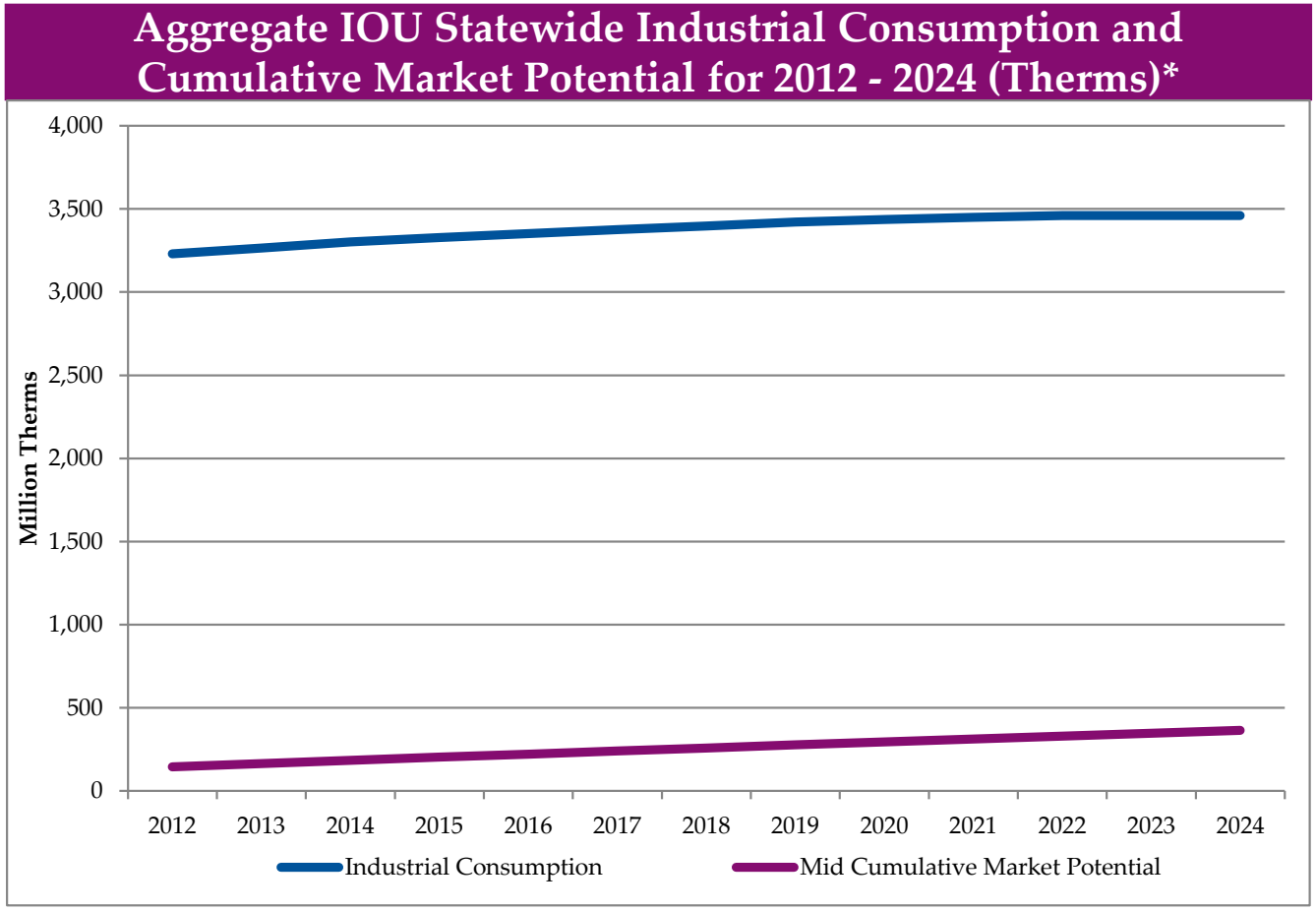
2013 Preliminary Results - Do Not Cite



Cumulative Market Potential in 2024: 10.5% of Industrial Consumption.

*Cumulative market potential reflects measure installations starting in 2006.

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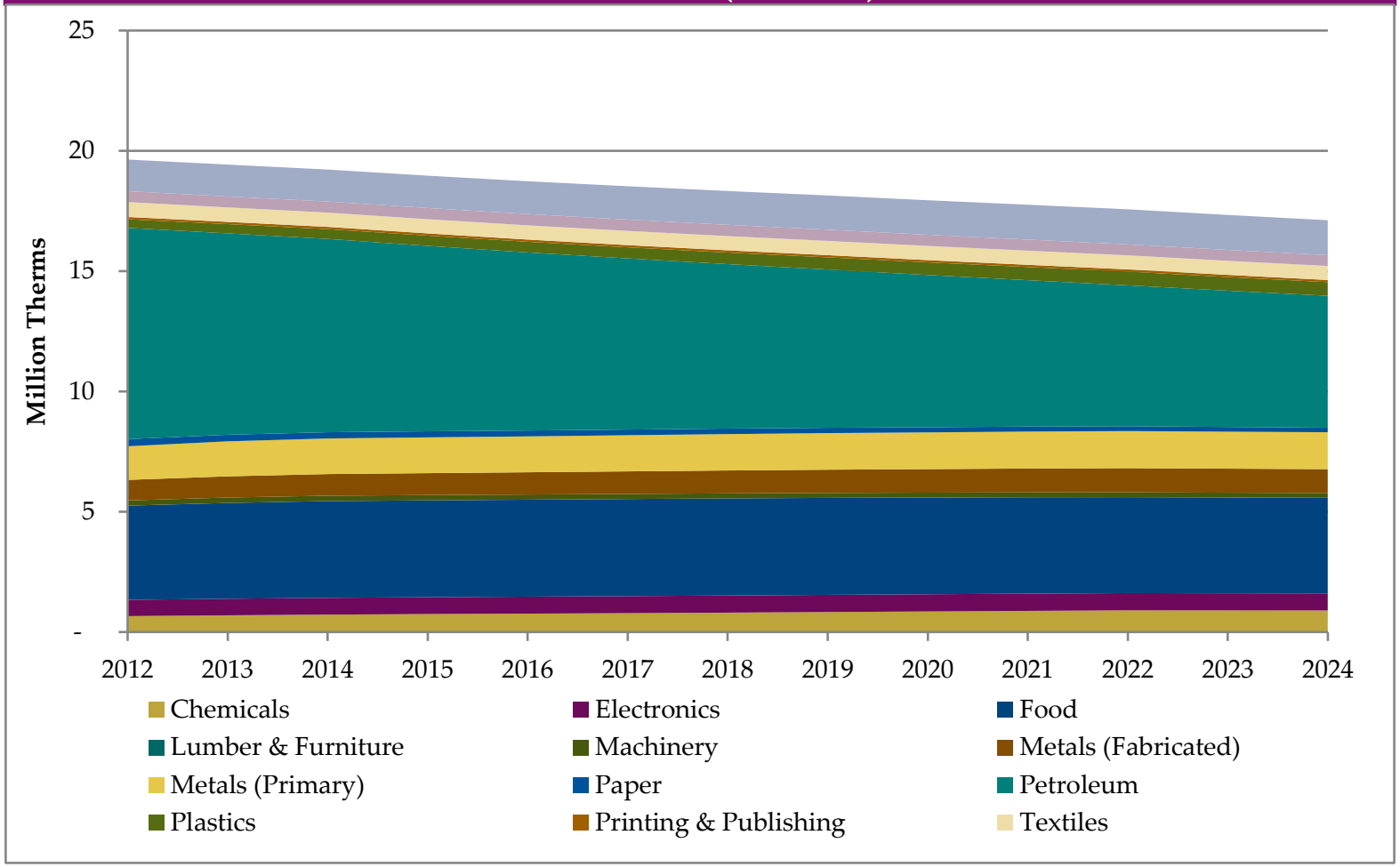
2013 Preliminary Results - Do Not Cite

Aggregate IOU Industrial Incremental Market Potential by Sub-Sector for 2012 – 2024 (Therms)



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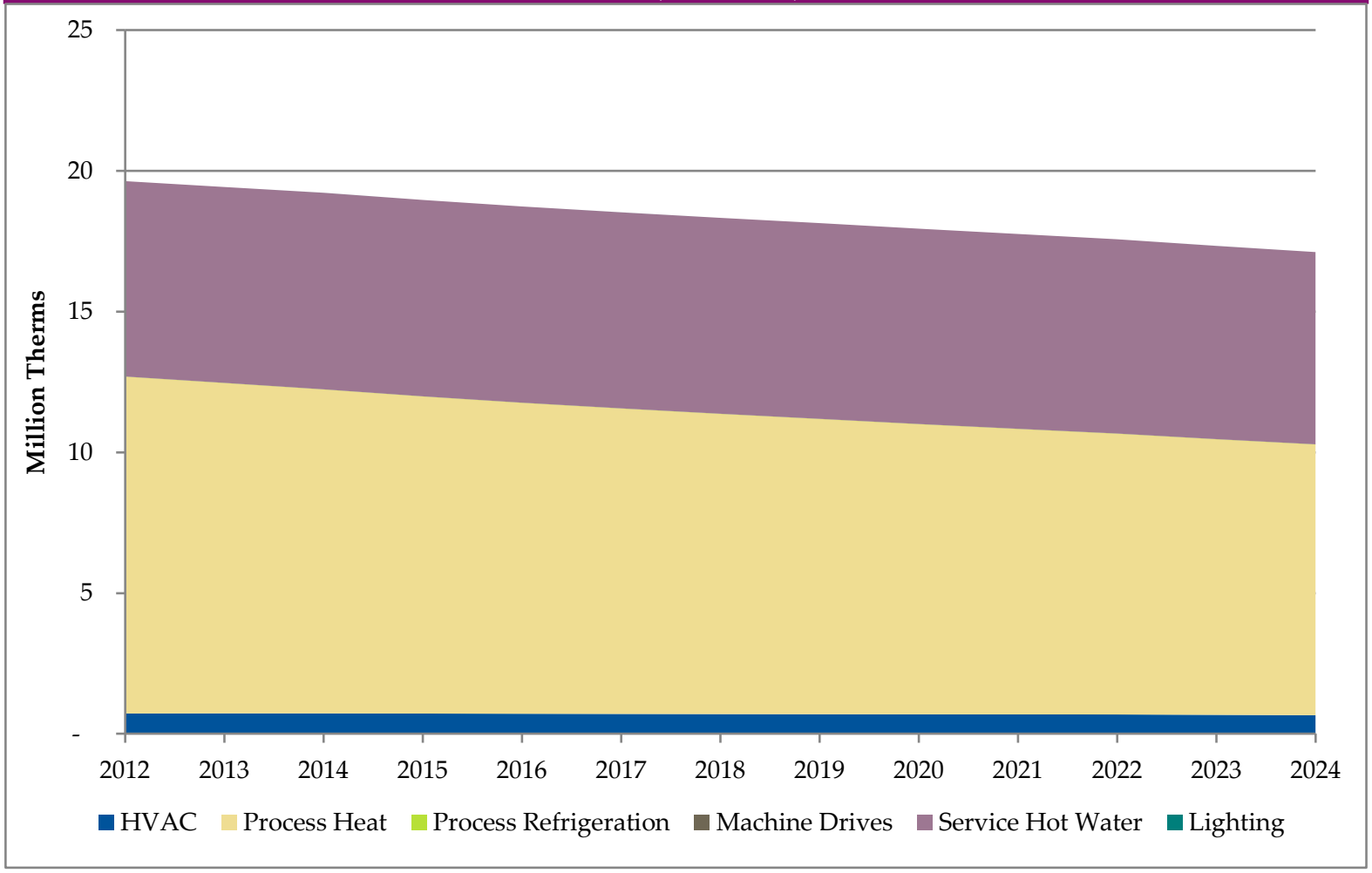
2013 Preliminary Results - Do Not Cite

Aggregate IOU Industrial Incremental Market Potential by End-Use for 2012 – 2024 (Therms)



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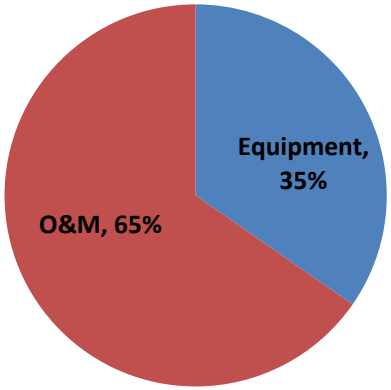
Summary of 2013 industrial sector potential model issues.

- **How accurate is the forecast?**
  - Are technical and cumulative potential forecasts in the ballpark?
    - Cumulative market potential for saving electricity is about 10% of forecasted sector consumption by 2024, same for gas.
  - Is the market for EE expanding as people look harder at energy, or contracting and EE opportunities are addressed or as codes and standards, such as NEMA Premium motors, replace older equipment?
  - Is the market for EE expanding as people look harder at energy, or saturating as EE opportunities are installed or codes and standards upgrade older equipment?
  - Do O&M opportunities 'refresh' such that there is an ongoing capacity for continuous improvement?
  - Is the distribution of savings between O&M (65%) and equipment savings (35%) reasonable?



- **Do EE policies compliment this models interpretation that data?**
  - Is it clear how EE policies allow for incentives to be paid on O&M activities vs. equipment replacement?

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